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Water Supply Reliability Objectives in the CALFED Bay-Delta Program

Water Supply Reliability Planning

Traditionally, twentieth century water supply planning involved the steps of quantifying an unmet water demand, identifying water projects that might provide a supply to meet the need, and selecting the project with the best cost-benefit ratio. As environmental awareness increased and legislation such as NEPA, CEQA, state and federal ESAs, and the CWA were enacted, the steps of identifying potential environmental impacts, developing mitigation plans, and obtaining required permits were added. Costs for water supply projects increased substantially due to the combined effects of mitigation requirements and the reality that the most cost-effective projects (at least from a limited standpoint of water supply costs) had already been developed.

The higher costs and difficulty in navigating the regulatory process resulted in a drastic decline in development of new water supply projects in the last two decades. As populations grew and demands continued to increase, water managers placed more emphasis on water conservation measures to make more efficient use of available supplies. Even with these efforts, water shortages became more commonplace. Water managers began using the concept of *water supply reliability* as a measure of a water system's expected success in avoiding detrimental economic, social, and environmental effects from shortages. The water supply reliability for a particular agency depends on the size, frequency, and duration of shortages, the types of water use affected, the costs of using contingency water management measures, and the losses associated with shortages.

In recent years, *integrated resources planning* has become a standard tool for water supply reliability planning. Through integrated resources planning, demand management options are given equal consideration with supply augmentation measures in devising a water management plan. Integrated resources planning embodies a least-cost planning approach to determine the set of water management actions which should be implemented. Under this approach, an agency's water supply reliability would be considered optimal if taking further action to increase reliability would cost more than not taking action, when all economic, social, and environmental costs and losses are considered for each alternative action.

In preparing an integrated resources plan, all local demand management and supply augmentation measures should be considered, as well as imported supplies that might be available through water transfers or from regional, State, or federal water projects. Because of the complexity of this evaluation and the local authority required to implement most demand management options, integrated resources plans are most successfully developed and implemented at the local water agency level. State and federal water project planning should incorporate local integrated resources plans and environmental considerations in determining appropriate levels of State and federal water supply development and in formulating project operation policies.

SWP and CVP Water Project Operations

The operational flexibility in water project systems such as the SWP and CVP depends on the natural variability in runoff, available storage capacity, conveyance capacity, and institutional constraints that provide for ecosystem health and protection of water quality. Within these constraints, the projects can be operated to provide greater supplies in critical dry periods by imposing higher storage carryover requirements or to provide greater long-term average annual supplies by limiting carryover requirements. Reducing carryover requirements significantly increases long-term average supplies by more frequently providing available storage to conserve water during high flow periods; however, this type of operation also creates greater variability in the quantity of water delivered from year to year.

SWP and CVP project operations have a significant effect on the water supply reliability of contracting agencies that receive a substantial percentage of their total supplies from these projects. The extent of influence of project operations on an agency's water supply reliability depends on the agency's other sources of supply, storage available to regulate variability in imported supplies, and other shortage management options available to the local agency.

As described above, water supply reliability needs must be defined on an agency by agency basis, with consideration given to local types of water use, the costs of using contingency water management measures, and the losses associated with shortages. For most SWP-contracting water agencies, total water supplies come from multiple sources, including reuse of treated water, local surface and ground water supplies, as well as imported supplies from regional or federal water projects. These agencies can use the water management options available to them to deal with some variability in SWP supplies and thereby take advantage of long-term supply benefits of lower-carryover SWP operations. On the other hand, westside San Joaquin Valley CVP contractors are more limited in their management options due to a lack of local surface water supplies, large depths to usable groundwater, and perched shallow groundwater conditions that limit conjunctive use operations. To optimize operations within the inherent system constraints, the SWP and CVP must account for the water supply reliability needs of all contracting agencies.

Water Supply Reliability and the CALFED Bay-Delta Program

The CALFED Bay-Delta Program long-term solution must address four general categories of critical problems facing the Bay-Delta: ecosystem quality, water quality, water supply reliability, and system vulnerability. Among the solution principles which serve as fundamental guides when evaluating alternatives is the concept that solutions must be equitable -- a solution to problems in one resource category will not be pursued without addressing problems in the other resource categories. The Program's primary water supply reliability objective is to *"Reduce the mismatch between Bay-Delta water supplies and current and projected beneficial uses dependent on the Bay-Delta system."* Possible program actions that could improve water supply reliability include policy measures to improve water use efficiency, operational and institutional measures

to improve water transfer opportunities, Delta conveyance improvements and ecosystem restoration measures that reduce adverse effects of Delta export operations, and increases in storage to conserve additional water supplies during high flow periods and allow shifts in Delta exports to periods with less effects on fisheries.

To the extent that any of these potential actions are included in the Bay-Delta Program long-term solution, the action must be consistent with and balanced with actions that address the other program objectives. Additionally, final implementation of any of these actions is subject to NEPA, CEQA, federal and State ESA, and CWA regulations. Most significantly, CWA Section 404(b)(1) requires implementation of the least environmentally-damaging practicable alternative that meets Program Objectives. In application, this means supply augmentation measures such as new storage options will only be implemented if it is demonstrated that all practicable demand management options have been implemented or there are no other practicable alternatives for meeting the other Program Objectives regarding ecosystem quality, water quality, and system vulnerability. Moreover, if the need for storage is demonstrated, selection of the particular storage option implemented is subject to the same CWA Section 404(b)(1) criteria. Determination of the least environmentally-damaging practicable storage alternative cannot be made until project-specific investigations are complete.

In all, water supply development projects will not be implemented unless they are consistent with the multiple Program Objectives, the least environmentally-damaging practicable alternative for achieving the multiple Program Objectives, and compatible with local integrated resources plans. The complete evaluation required for final implementation of storage options will require an iterative process that is beyond the scope of Phase 2 of the Bay-Delta Program. During Phase 2, a more limited answer is sought: *What range and types of new storage and conveyance options and changes in project operations are consistent with the Program Mission and multiple Program Objectives?* As a part of the Phase 2 process, the expected water supply benefits and costs associated with this identified range of storage will be estimated. In Phase 3 of the Bay-Delta Program, site-specific engineering and environmental studies and a final CWA Section 404(b)(1) alternative analysis will be completed before any potential new storage or conveyance projects are implemented. This work must be done hand-in-hand with water agencies that would receive the water supply benefits to assure consistency with local integrated resources plans.

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